Base Year: 1999 By: M. Nguyen

SOURCE INVENTORY

CATEGORY # 67 - 74

FILLING STATIONS - STORAGE TANKS

1999 EMISSIONS

Introduction

Emissions from gasoline service stations are generated when gasoline vapors in the underground storage tank are displaced to the atmosphere by the gasoline being loaded into the tank. The emissions are due to breathing (vapor expansion and contraction of liquid in the tank) and working (from filling and emptying the tanks). Breathing losses occur as a result of dinural temperature and pressure variations. Working losses occur as fueling from underground storage tanks, fresh air is entered into the tank through the vent. Because this entering air is not at equilibrium with the liquid in the tank, evaporation of liquid occurs. Most gasoline dispensing facilities (GDF) in the Bay Area were equipped with Phase I and/ or Phase II vapor recovery systems. Phase I vapor recovery system employs a dual hose that recovers gasoline vapor back to the tank truck during the filling of underground tanks. The integral part of Phase II vapor recover system is the vapor recovery nozzle and hose that efficiently collect the displaced vapors.

Methodologies

These categories account for organic emissions associated with the storage of fuel at vehicle filling stations. The estimates of gasoline consumption in the Bay Area were provided by Caltrans' Transportation Planning Support Information System (TPSIS). These estimates were made by adjustments of Gasoline Dispensing Facility (GDF) sales, total taxable gasoline sales from California Board of Equalization, population, number of registered vehicles, and the number of driver' s license. The throughput for each type of GDF was estimated based on the information contained in the District's data bank. There are 2,548 GDF in operation in the Bay Area.

The 1999 gasoline consumption is 3,132,470 thousand gallons or 8,552 thousand gallons per day. Emission factors were taken from AP-42, Section 4.4. The total emissions for area source categories are determined by multiplying the emission factor, control factor and throughput. The estimated 1999 gasoline throughput and emission factors used for each category are shown in the following table.

Category	1999 Throughput (1000gallons/ day)	TOG Emission Factor (lbs/1000 gal)	1999 Emissions (Tons/day
#67, Breathing - not equipped with Phase I and II	9.5	.77	.004
#68, Breathing – equipped with Phase I and II	8,552	.06	.249
#69, Breathing – equipped with Phase I only	20.6	.77	.008
#70, Breathing – equipped with Phase II only (Point Source Categories)			.014
#71, Working - not equipped with Phase I and II	9.5	7.27	.036
#72, Working - equipped with Phase I and II	8,552	0.48	2.034
#73, Working - equipped with Phase I only	20.6	0.48	.005
#74, Working - equipped with Phase II only (Point Sources Categories)			.001
Total		0.27*	**2.35**

* The composite emission factor was calculated based on 2.35 Tons/day TOG emission shown in the table.

Monthly variation

Monthly variation of emissions was based on gasoline usage data for California. The monthly Bay area gasoline usage was estimated from Board of Equalization Taxable Gasoline Sales monthly report.

County Distribution

Emissions distributed into the nine counties were based on Caltrans' Transportation Planning Support Information System's breakdown.

TRENDS

History

Emissions for these categories had been reduced due to Phase I and II vapor balance system requirements since 1975. Prior to 1990 Base Year, taxable gasoline sales for California obtained from the Board of Equalization were assumed to distribute to all gasoline filling stations in the California. ARB estimated that Bay Area consumed 20.01% of this state total. The emissions for this category were determined according to this estimated throughput.

Growth

Gasoline consumption in 1990 reached record levels; however, the gasoline consumption decreased slightly during the economic recession between 1991 and 1993. Projections are based on future gasoline consumption in the Bay Area.

Control

Emissions were reduced due to the effect of Regulation 8, Rule 7, Phase II requirements and the following actions:

- In July 1976, California Health & Safety Code required CARB certified 90% Phase II gasoline dispensing facilities.
- In August 1978, CARB amended Phase II GDF to 95% efficiency.
- In July 1986, CARB issued "Rectification Orders".
- In October 1990, District adopted pressure-vacuum valve requirements for GDF.
- In January 1992 , Re-formulated Gasoline, Phase I , and
- In January 1999, Re-formulated Gasoline, Phase II.

In March 2000, California Air Resources Board (CARB) adopted a series of new Enhanced Vapor Recovery (EVR) amendments to its gas station vapor recovery regulations (Phase I and Phase II). In addition, CARB adopted new standards:

- to make vapor recovery system compatible with on-board vapor recovery (ORVR) systems on motor vehicles,
- to reduce gasoline spillage, liquid retain in the nozzles, and
- to pressure-related fugitive emissions.

The adopted amendments also include mandatory In-Station-Diagnostics (ISD), which are requiring electronic monitoring of vapor recovery system operation and performance. The table below summarizes the EVR implementation schedule.

Control Type	Effective Date	Certification Requirement Date
Phase I Vapor Recovery	4/1/2001	4/1/2001
Phase II Vapor Recovery	4/1/2003	4/1/2003
ORVR Compatibility	4/1/2001	4/1/2003
Liquid Retention • Initial limit: 350 mls/1000 gallons • Final limit: 100 mls/1000 gallons	 4/1/2001 4/1/2001	 4/1/2001 4/1/2003
Spillage and Dripless Nozzles	4/1/2001	4/1/2004
In-Station Diagnostics • >1,800,000 gal/year • >160,000 gal/year	 4/1/2003 4/1/2004	 4/1/2003 4/1/2004